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ABSTRACT

This student reference booklet is designed to accompany lessons outlined in the companion instructor's guide on beef production. Together, the student reference and instructor's guide form part of the Animal Science I core curriculum. This unit on beef production is divided into five lessons in these areas: selection of breeding stock, breeding and gestation, cow-calf management, backgrounding feeder cattle, and finishing feeder cattle. Each lesson consists of informative material for the student. A brief summary concludes each lesson. (YLB)

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Beef Production
Beef Production
Beef Production
Beef Production
Unit

For
Agricultural Science I Core Curriculum

Student Reference

ED 348657

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FOREWORD

This student reference is designed to accompany lessons outlined in the Beef Production instructor's guide as a part of the Animal Science I curriculum. It will also be of value to those seeking a basic understanding of beef production management.

Livestock receipts play an important role in the financial picture on many Missouri farms. Livestock accounted for 53% of the cash receipts on Missouri farms in 1985. The largest portion of that 53% was in cattle and calf production. The value of animals and meat products in the state was $25.4 million in 1985.

Missouri is a national leader in beef production, ranking second in 1985 cattle operations, beef cow inventory and number of calves born. Missouri ranks seventh in total cattle and calf inventory, as a large number of feeders are shipped out-of-state for finishing.

This unit is divided into five lessons in the following areas: selection, breeding and gestation, cow-calf management, backgrounding and finishing.

Persons using this reference on an individual basis may wish to secure a copy of the instructor's guide for additional materials on basic beef management.

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BEEF PRODUCTION

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UNIT - BEEF PRODUCTION

Lesson 1: Selection of Breeding Stock

Selecting the right type of beef animal is essential when beginning a new beef production enterprise and for improvement of an existing enterprise. Both commercial cattle producers and registered beef breeders must practice a stringent selection process to maintain a continual output of top-quality beef animals. Visual selection is an important cog in this process, but production information should be given equal consideration in making selection decisions.

Beef Breeds

The following discussion of beef breeds includes characteristics of each major breed. These breeds are sorted into three major categories.

British breeds - **Angus** cattle are black in color and polled. They originated in Aberdeenshire and Angushire of Scotland and were imported into the U.S. in 1873 to cross with Longhorns. **Hereford** cattle are distinguished by a red body and white face. This horned breed was introduced in the U.S. in 1817 by Henry Clay. **Polled Herefords** are polled with red bodies and white faces. They were bred in 1901 by Iowan Warren Gammon, who accumulated several naturally polled cattle from horned Hereford herds. **Red Angus** are polled and red in color. The breed was founded as a performance breed in 1954 by sorting out genetic recessives from Black Angus herds. **Shorthorn** are red, white or roan in color. The breed, both horned and polled, was introduced into the U.S. in 1783 under the name "Durham." It was most prominent in the U.S. around 1920.

Exotic breeds - **Brahman** cattle are variously colored, but grays are predominant. Brahman are one of the Zebu breeds with the hump over the top of the shoulder; large, drooping ears; and excess skin in the throat and dewlap. The breed is heat tolerant and well adapted to harsh conditions in the Gulf Coast region. Major importations to the U.S. occurred in the early 1900s from India and Brazil. **Charolais** are white colored. Heavy muscling predominates, and the cattle may be horned or polled. One of the oldest breeds in France, Charolais were brought to the U.S. soon after World War I. The number of Charolais in the U.S. expanded rapidly in the 1960s. **Chianina** are white in color with black eyes and noses. This extremely tall, old breed originated in Italy. It is acknowledged to be the largest breed.

Gelbvieh cattle are golden colored and originated in Austria and West Germany. Gelbvieh were developed as a dual-purpose breed (draft, milk and meat). **Limousin** cattle are golden colored with marked expressions of muscling. The breed was introduced into the U.S. in 1969, primarily from France. **Maine-Anjou** cattle are red-and-white spotted. This large breed was developed in France and was introduced into Canada in late 1968. **Simmental** colors vary, from yellow to red-and-white. Both polled and horned, this breed is prominent in parts of Switzerland and France. The first bull arrived in Canada in 1967. It was originally selected as a dual-purpose milk and meat breed.

Cross-derived breeds - **Beefmaster** cattle are not limited to any particular color. The breed was developed in the U.S. from Brahman, Hereford and Shorthorn breeds. It is often selected for its ability to reproduce, produce milk and grow under range conditions. **Brangus** cattle are predominantly black and polled, although there are also Red Brangus. The breed developed around 1912 in the U.S. to become three-eighths Brahman and five-eighths Angus. **Santa Gertrudis** are red colored and horned. This breed, the first to be developed in the U.S., was bred on the King Ranch in Texas. Santa Gertrudis are a combination of five-eighths Shorthorn and three-eighths Brahman.

Guidelines for Selecting Cows and Heifers

Select replacements from top-producing cows. These cows will milk heavily to produce calves with heavier adjusted 205-day weaning weights. Disposition, femininity and records on post-weaning performance of the calves can also help in identifying top-producing cows.

Select only healthy animals that are free from disease. Females should be vaccinated and from a common source, if possible. Begin the selection process at birth. Keep back more heifers than will be eventually needed for replacements to allow for culling. At birth, identify two heifers to keep for every one herd replacement needed. Cull from this pool any heifers which do not measure up as they mature. Because some heifers may be infertile, try to breed at least 10% more heifers than will be needed.

Production Characteristics

Keeping production records on each cow will help in identifying the top-producing cows. A lifetime record for each cow can be kept in one notebook. Record the birth data and the birth weight of each calf in separate records.

At weaning, weigh calves and adjust their weights to a 205-day basis. A frame measurement and a USDA feeder cattle grade may also be recorded.

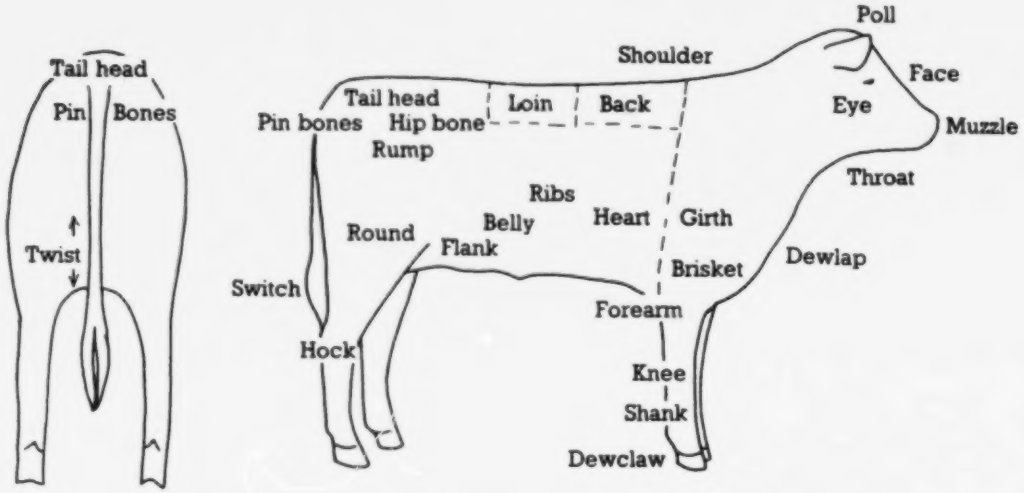
In the post-weaning period, weigh the calves again at 365 days. Postweaning gains, height, frame score, trimness and soundness of each calf can then be compared. Additional information includes carcass data such as size of the loin eye area and fat thickness over that area, between twelfth and thirteenth ribs.

Visual Selection

Various terms are used to describe the parts of a beef animal. To communicate effectively with other producers, become familiar with the parts of a beef animal in Figure 1.1.

Remember that the end result of beef production is to put quality meat on the consumer's table. The consumer is interested in beef which is lean and tender with a minimum of fat. Visual selection, then, should place emphasis on selecting a beef animal which has more muscle (red meat on the carcass) in areas which will bring the most money, such as the round, short loin and sirloin. Refer to the IML Meats units for more information on cuts of meat.

FIGURE 1.1 - Parts of a beef heifer



In visual selection, the producer must look for good conformation, which refers to how the animal is physically put together. A good judge will compare each part individually, as well as the way those parts combine.

When judging for visual selection, study the animal from the side and the rear. Look for a long, trim, deep-sided body which is trim through the brisket and both flanks. The loin and round areas should be heavily muscled, and the animal should be the proper height at the top of the shoulder and hip. A potential replacement heifer must walk freely, show feminine characteristics (which can indicate fertility) and have good bone structure, especially in the feet and legs. If a purebred, look for breed character. From the rear, check the animal for width through the center of the round, depth of the round and width between the rear legs.

Combining Production Information and Visual Selection

Beef producers should use both production information and visual selection to improve the quality of their herds; more rapid genetic progress can be made because replacements come from top-producing cows.

Records are the key to keeping track of production information. Some of the information which will help the producer make selection decisions include birth weights, weaning weights, yearling weights and frame scores.

When gauging the success of the selection process, a producer should keep in mind the heritability estimates for the traits being emphasized. Traits with low heritability estimates are due less to the genetic background of the individual and more to environmental factors, such as nutrition and management. A producer who wants improvement in a trait with a low heritability estimate should expect slow progress in that trait between generations unless the management, nutrition and other environment factors change. More rapid

genetic progress between generations should be expected if highly heritable traits are emphasized. The chart below lists the heritability estimates of some important traits.

TABLE 1.1 - Heritability estimates for economic traits in beef cattle

Trait	Heritability estimate
High heritability:	
Loin eye area of the carcass	70
Retail yield of the carcass	60
Tenderness of the meat in the carcass	60
Yearling weight	60
Postweaning gain in the feedlot	57
Carcass grade	45
Dressing percent of the carcass	45
Postweaning gain on pasture	45
Birth weight	40
Cow maternal ability	40
Efficiency of gain in the feedlot	40
Preweaning gain	40
Medium heritability:	
Conformation score at weaning	30
Weaning weight	30
Low heritability:	
Fertility	10

Summary

Selecting the right beef animal should involve both visual selection and production information so that replacement heifers come from top-producing cows. Each producer should set minimum standards for the herd. Keeping production records is an important step in documenting the performance of individual cows in the herd.

Credits

University of Missouri-Columbia Extension Division agricultural publications

a) G2005: Value of Beef Performance Records (1985)
b) G2220: Beef Carcass Grading and Evaluation (1979)
c) MP474: Missouri Beef Cattle Improvement Programs (1984)

UNIT - BEEF PRODUCTION

Lesson 2: Breeding and Gestation

During the breeding and gestation period, good management--along with feeding and nutrition--is essential to developing a calf that will be healthy at birth and grow into a vigorous young animal. Many breeding problems that producers encounter are due to poor nutrition before and during the breeding/gestation period.

Breeding Age for Heifers

A heifer that can be bred to calve as a two-year-old will produce one more calf in her useful lifetime than if she were bred to calve as a three-year-old. Heifers should be bred at two years of age if they meet the following conditions: 1) have reached a standard weight (600-700 pounds for British breeds, 700-800 pounds for exotic breeds) and 2) have reached the standard weight by growth and **not** by fattening.

Heifers must be showing signs of their estrus period (heat). Some indications that a heifer is coming into heat are as follows.

1. A small string of mucus dripping from a reclining cow
2. A heifer that bawls repeatedly while herdmates are quiet
3. A female that is more alert and observant
4. A cow that stands while all other herdmates are lying down

Standing heat can be observed in females with the following signs. The cow may be seen sniffing like a bull does when checking cows. Some cows may attempt to ride others that are in heat. A cow in heat will stand still while other cows mount her or may have mucus on the side of the tail or rump.

There are also signs of heat completion. A matted hair coat, usually over the top of the shoulders, indicates the cow was in heat the night before. A cow that has just gone out of heat may be lying down while herdmates are standing or may have mud on her hips or some hair rubbed off. A string of blood on the cow's tail or rump is a sign that the cow had been in heat 2-3 days earlier.

Feeding During Breeding and Gestation

A beef cow or heifer uses the nutrients she eats according to the following priorities: 1) maintenance, 2) milk production, 3) growth and 4) reproduction. This means that energy and nutrients needed for reproduction are only extracted from the diet after all the other requirements are met. This hurts the beef producer in two ways--the underfed cow will "starve" the calf she is nursing, weaning a smaller calf, and she will not become pregnant as quickly. In fact, she may not settle at all during the breeding season.

The most critical periods of reproduction energy needs are during the last 60 days before calving and the first 90 days after calving. Conception rates

will be increased if cows and heifers are gaining weight going into the breeding season.

Feed requirements during breeding and gestation will vary according to the size and condition of the cow or heifer and the time of year. Adequate amounts of energy, protein, vitamins (especially Vitamin A) and minerals (especially phosphorus) must be provided to cows and heifers during breeding and gestation.

Making good use of pasture and available roughages such as cornstalks and milo stubble is the key to keeping feed costs low. Stockpiling fescue (letting the growth accumulate) can be used to provide late-season and winter pasture.

It is important to provide plenty of clean, fresh drinking water at all times. The water source can be a pond, stock tank or an automatic waterer. If ponds or stock tanks are used, it will be important to keep the water unfrozen during the winter since water plays an important role in regulating body temperature.

Management Tips

Preparing the bull - Obtain and prepare the bull for breeding at least 60 days before the breeding season; condition him by feeding 8-12 pounds of grain daily before the breeding season. Gaining weight going into this period is as important for bulls as for cows. Make sure the bull is fertile and have him examined by a veterinarian for soundness **before** the breeding season starts.

Sufficient bull power - Supply enough bulls for the herd. Yearling bulls can service 10-20 cows, two-year-old bulls can service 25-30 cows and mature bulls can service 30-40 cows.

Breeding season - Start breeding heifers 30 days before the cow herd and stop 30 days before the end of the cow breeding season. Begin rebreeding cows 45-60 days after calving. Establish a definite breeding season of 45-60 days so that specific dates for the calving season can be established and calving is not spread over the year.

Other tips - Pregnancy check all cows and heifers in the herd. A producer cannot afford to carry an open cow for a year without a calf being produced. Use regular blood testing, vaccination and sanitation programs to detect and prevent diseases.

Summary

To manage the breeding herd during breeding and gestation for a 90% calving rate, a producer should follow these pointers.

1. Breed heifers to calve at two years of age.
2. Use the early calving system.
3. Feed adequate amounts of energy, protein, vitamins and minerals.
4. Follow other management tips such as preparing the bull for the breeding season, supplying enough bulls for the herd, establishing a

definite breeding season and pregnancy checking all cows and heifers in the herd.

Credits

University of Missouri-Columbia Extension Division agricultural guides

a) G2006: Increase Your Calf Crop (1980)
b) G2062: Wintering Beef Cows (1963)
c) G2908: Livestock Breeding Pointers (1981)

UNIT - BEEF PRODUCTION

Lesson 3: Cow-Calf Management

Getting the newborn calf off to a good start is an important step in producing top-quality feeder calves. This lesson will discuss the management practices necessary to raise calves that will bring the highest returns.

Facilities and Equipment

Cow-calf systems need a minimum of facilities. Trees or natural terrain can provide adequate shelter for most of the year. Spring or fall calves can be born in a pasture. Early calves, however, need some type of shelter for the first few days after calving, such as an open barn.

Because of differing nutrition needs, separate areas should be used for wintering cows, first-time heifers, bulls and calves, if possible. These areas should be located close to the farmstead for easier observation and feeding.

A corral system is needed for all cattle production systems. Minimum facilities include a holding pen, a working chute and a headgate. Optional features would include additional holding pens, weighing scales and blocking gates to keep cattle from backing up in the chute.

Clean, accessible water is needed at all times. In the winter, check frequently for ice build-up. If chopping through ice on a pond, stand on the shore unless the ice is 3-4 inches thick. Use caution; slick ice and a sharp axe is a dangerous combination.

Managing Cows at Calving

Facility preparation - Have the facilities ready for calving. Cows should be in an area where they can be checked easily and frequently. Prepare some individual, sheltered pens at calving time for livestock needing medical treatment or additional shelter.

Labor signs, normal and abnormal - Observe cows for signs of calving, such as nervousness and restlessness, more frequent urination, loose muscles in the tail area, milk production, leaving the herd and signs of labor. Provide assistance if the calf is not born 45-60 minutes after the water breaks. Observe cows in labor for any problem signs, such as the following.

1. Cow is nervous: stands up and lies down often.
2. Cow tries to deliver standing up.
3. The position of the calf is abnormal.

If any of these problem conditions occur and the producer cannot correct it, a veterinarian should be called immediately. Producers who have experience can help the cow when the calf is abnormally positioned. Correcting an abnormal presentation involves reaching inside the cow to change the calf's position

(see Figure 3.1). Before attempting to correct an abnormal presentation or attach ropes or obstetrical chains, it is important to clean hands and arms completely with soap and water or to wear sterile, disposable gloves to avoid introducing infection.

FIGURE 3.1 - Common calving positions

With any kind of posterior presentation, delivery must be rapid once the calf is about halfway out. At that point, the umbilical cord breaks and the calf begins trying to breathe. If still inside the cow, it will smother or drown in the birth fluids.

Calf care - Attend to the calf as soon as possible after birth. Wipe any mucus from the nose and mouth immediately. If the calf has started to breathe inside the cow, hold the calf up with the head down to drain out any inhaled fluids. If the calf is not breathing, work its legs, push on the chest or give it a hard slap. Disinfect the calf's navel.

Cow-calf bonding - Once the calf is breathing normally, allow the cow to lick the calf dry. This serves two purposes by drying the calf and marking the calf for the cow. If the cow cannot or will not lick the calf, dry it off with clean rags. The calf should nurse as quickly as possible. At birth and for a few days afterward, the cow's milk is richer than normal in nutrients and antibodies. A newborn calf has little disease resistance, so getting the colostrum soon after birth is very important.

If the cow's udder is very swollen, some of the teats may be large enough that the calf cannot nurse. Milk the cow somewhat to reduce the swelling.

Cow care - The cow's afterbirth should be expelled shortly after calving. If the cow fails to clean properly (12-18 hours after calving), contact a veterinarian. A retained placenta can cause infection and prevent the cow from rebreeding.

Keep cows that have calved separate from others when possible. Watch for any signs of mastitis or udder injury. Early detection may help to save the calf and will allow treatment so the cow can stay in the herd.

Managing Calves to Weaning

Records - Identifying each calf with an ear tag, tattoo, neck chain or ear notch can be done while disinfecting the navel. Record information about the calf and the delivery, such as the date, sex, weight and any difficulties.

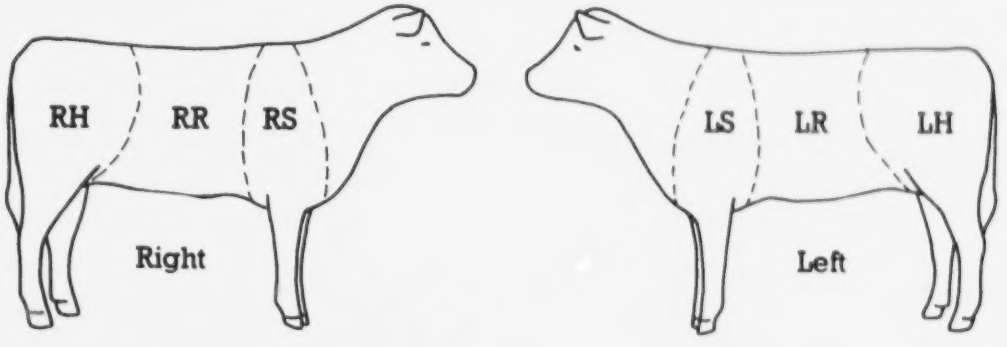
Castration - Castrate bull calves that are not to be kept for breeding purposes. Although bull calves weigh more at weaning than steers, castrating calves at a young age has advantages in calf handling, calf recovery and feeder prices. Commercial producers generally castrate bull calves before weaning--preferably before four months of age. Purebred producers may wait until after weaning in order to evaluate weaning weights for bull selection.

Several methods of castration are common. When the calf is a few days old, elastrator bands are placed around the scrotum, above the testicles. At 3-4 months of age, the clamp method crushes the calf's cord and shuts off blood to the testicles. With either of these two methods, the producer must make sure to use good technique to assure a complete castration. Another method uses a knife to surgically remove the testicles of calves at 3-4 months of age. With this method, watch the calf closely for continued bleeding or infection.

Dehorning - Horned calves are often discounted when sold as feeders since dehorned calves can do less damage to facilities and to other calves. Horns can be removed mechanically, with electrical dehorning irons or by using a caustic chemical. Use a fly repellent if dehorning during the fly season.

Cattle identification - Permanently identify all cattle to help prevent theft. In Missouri, a hot-iron brand is the only legal brand and must be registered with the state veterinarian. See Figure 3.2 for branding locations.

FIGURE 3.2 - Brand locations



RH - Right Hip
RR - Right Rib
RS - Right Shoulder

LS - Left Shoulder
LR - Left Rib
LH - Left Hip

Other methods include neck chains, ear tags, tattoos, freeze brands and ear notching. While many of these methods may be used for local purposes, they are not considered legal I.D. and do not deter theft. Record the marking system used, whatever method is chosen.

Weaning - Wean calves by six months of age. The longer the calf nurses past this time, the greater the chance of udder injury.

Feeding the Cow and Calf

The first four months after calving is a critical period because it is the period of highest milk production. At this time, the calf receives most of its nutritional needs from the cow. Essential nutrients during lactation are energy, protein, vitamins (especially Vitamin A) and minerals (especially calcium, phosphorus, salt, cobalt, iodine and magnesium).

Feed requirements will vary for each cow according to her size and condition and the time of year. Making good use of pasture and available roughages is important for keeping feed costs low. Provide plenty of clean, fresh water at all times.

Creep Feeding

Creep feeding is the feeding of concentrates to suckling calves to supplement mother's milk. Calves that have been creep fed should gain 25-125 pounds (study results average 60 pounds of gain). It will take 6-9 pounds of feed for every pound of additional weaning weight. Producers should evaluate current conditions, then decide whether creep feeding would be profitable for their operation. Locate the creep feeder near water or in the shade where cattle loaf frequently.

Profitable creep feeding - Creep feeding can be lucrative for the producer in situations such as the following.

1. Where heavy weaning weights and extra bloom is desired in purebred herds
2. When the fall calving system is used
3. When pastures are poor
4. During drought years
5. When there are large numbers of first-calf heifers or cows over 11 years old in the herd
6. When the herd has a history of poor milkers
7. With steer calves
8. When heavier feeder calves would sell for more per pound than light-weight feeders
9. When grain prices are low in relation to feeder calf prices

Unprofitable situations - Producers are unlikely to see creep feeding pay off when calves are to be pastured or wintered on roughage after weaning and before being finished, when grain feeding will continue for more than 90 days after weaning, when pasture is excellent for the cow herd throughout the summer or when spring calves are to be sold as feeders in the fall.

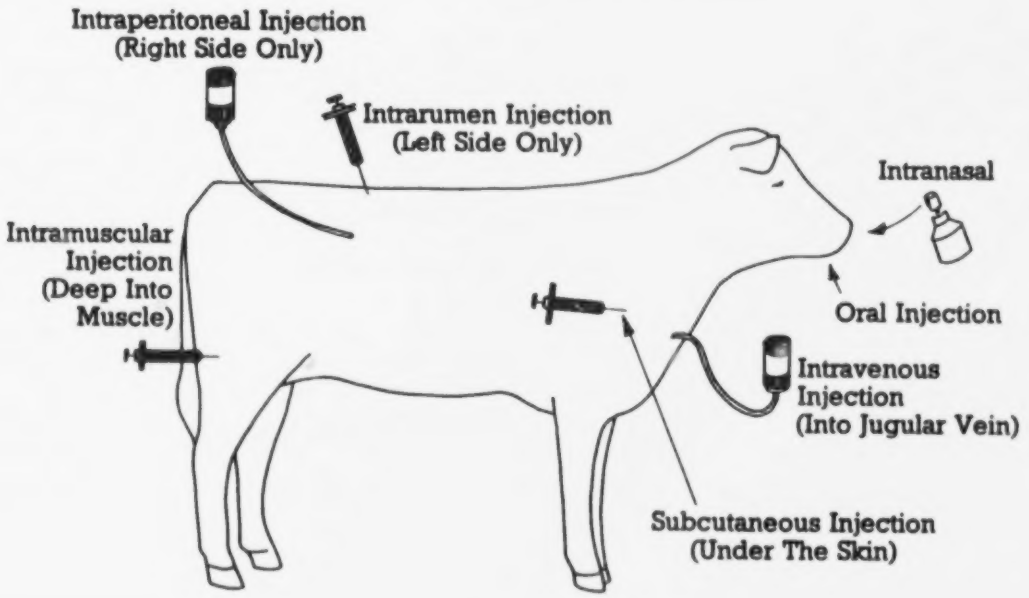
Controlling Diseases and Parasites

The primary goal of a beef herd health program is to produce a healthy calf during the birth to weaning period. To get a healthy calf at birth, producers should concentrate on keeping the cow healthy during gestation. A secondary goal of the herd health program is to produce a calf that will survive and remain in good health during the feedlot period.

The importance of colostrum in keeping young calves healthy cannot be over-emphasized. Antibodies in the colostrum protect the calf during the first few weeks as it builds up its own resistance.

Injecting drugs in the wrong place or giving the drug in the wrong manner can cause reduced effectiveness of the drug, an adverse reaction, illegal drug residues or even death. Figure 3.3 shows the location of some common drug administration sites.

FIGURE 3.3 - Drug administration sites



Following a systematic health program will help meet these goals. Table 3.1 outlines a year-round herd health program.

TABLE 3.1 - Beef herd health program

Approx. age	Recommended procedures
2 months	Castrate, dehorn and give blackleg and malignant edema bacterin. Identify animals. Start health records.
4 months	Give IBR, PI-3, brucella and pasteurella vaccines to all heifers; give blackleg and malignant edema bacterin to all cattle.
5 months	Give BVD-MD, PI-3 and Leptospira Pomona and pasteurella vaccines. Treat for external and internal parasites as indicated.
6 months	Wean 30 days before shipment. Records should accompany animals when sold.

Summary

Beef producers with cow-calf systems usually need a minimum of facilities. Those who use early calving will need some type of shelter for the calves the first few days after birth. All producers will need a corral system with a holding pen, working chute and headgate.

Frequent observation is the key to managing cows at calving. When the calf is born, each one should be identified and production information collected. Later, bull calves should be castrated and all horned calves dehorned. Permanent identification of each calf is also recommended to discourage theft.

Feed requirements vary for each cow, but the first four months of lactation are critical for good milk production. Creep feeding can be a good idea, especially when pastures are in poor condition, but may not always pay off. Following a systematic herd health plan is important in producing a healthy, vigorous calf.

Credits

Beef Handbook I: Nutrition and Beef Handbook II: Cow-Calf. University of Missouri-Columbia Extension Division, 1968.

University of Missouri-Columbia Extension Division agricultural guides

a) G2062: Wintering Beef Cows (1963)
b) G2201: Freeze Branding Cattle (1986)
c) G2203: Branding Livestock (1986)
d) G2205: Preventing Cattle Theft (1980)

Beef Housing & Equipment Handbook, 4th ed. Ames: Midwest Plan Service, Iowa State University, 1986.

UNIT - BEEF PRODUCTION

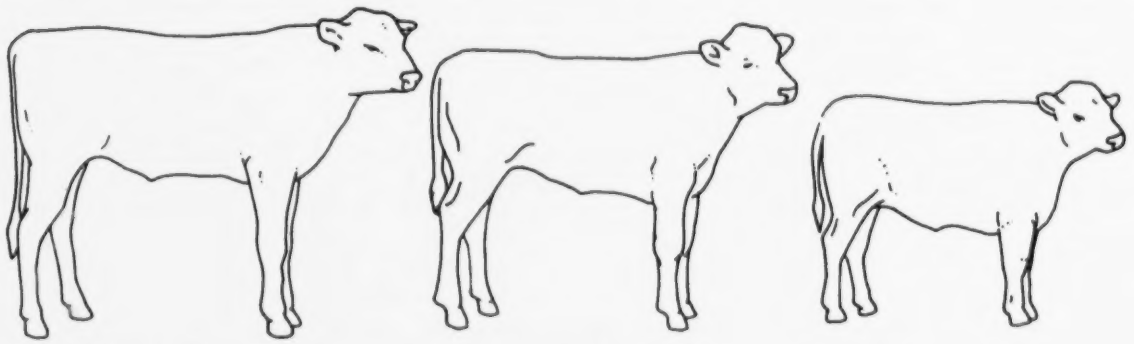
Lesson 4: Backgrounding Feeder Cattle

Backgrounding describes the process of growing beef steers and heifers from weaning until they enter the finishing feedlot. Backgrounding programs are common with farmers who seasonally have extra labor to work with cattle, have quality roughage available and want a flexible cattle enterprise. There are generally two types of backgrounding programs: summer grazing or wintering. Both systems will be discussed in this lesson.

Type of Cattle to Buy

Buying the right type of cattle for the right price is very important for a successful backgrounding program. Look for growthy, thin calves weighing 375-425 pounds that will grade choice when fed out to market weight. (See Figures 4.1 and 4.2) Some light calves are thin because they are sick. Other calves are thin because they are genetically inferior. From a profit standpoint, neither of these types will do very well in a backgrounding program. The right type of thin calf is thin because of a lack of feed, not because of sickness of inferiority.

FIGURE 4.1 - USDA grades of feeder steers



Large Frame
- Tall and long for age
- Half inch of fat
  Steers, 1200 lbs. or more
  Heifers, 1000 lbs. or more

Medium Frame
- Slightly tall and slightly long for age
- Half inch of fat
  Steers, 1000-1200 lbs.
  Heifers, 850-1000 lbs.

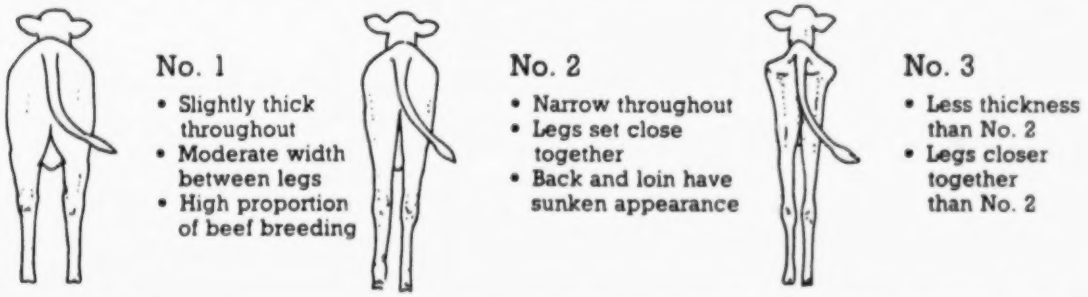
Small Frame
- Small frame and shorter-bodied for age
- Half inch of fat
  Steers, less than 1000 lbs.
  Heifers, less than 850 lbs.

When buying calves, know the market price for the type of cattle being purchased. Look not only for the large lots but also for the singles, doubles and bull calves that are good buys.

Buy preconditioned cattle when possible because they have been prepared for the stress of changing environments by the following procedures.

1. The calves would have been weaned 30 days before marketing.
2. Calves would have been adjusted to trough and bunk with appropriate medicated feed. These feeds are also sometimes recommended for preparing calves for weaning.
3. Calves would have been vaccinated for clostridial group diseases, Infectious Bovine Rhinotracheitis (IBR), Parainfluenza-3 (PI-3) and pasteurella at least two weeks prior to movement.
4. If worms were a problem in the area, calves would have been dewormed with injectable, drench or feed-additive dewormer.
5. The calves would have been treated with an approved grubicide at least two weeks prior to shipment.
6. Calves must have been castrated by knife at least 30 days prior to shipment, but preferably when one month of age.
7. The calves must have been dehorned.
8. Calves should have been implanted with an approved implant.
9. The calves would be identified with an ear tag and should be accompanied by a certificate from a veterinarian.

FIGURE 4.2 - USDA grades of feeder steers (calves)


No. 1
• Slightly thick throughout
• Moderate width between legs
• High proportion of beef breeding
No. 2
• Narrow throughout
• Legs set close together
• Back and loin have sunken appearance
No. 3
• Less thickness than No. 2
• Legs closer together than No. 2

Handling Newly Purchased Feeders

Calves which have recently arrived on the farm are under stress from being moved and are particularly susceptible to outbreaks of disease. Isolate newly arrived calves from other cattle on the farm for 30 days. Provide good-quality hay, free-choice salt and plenty of fresh water in an area that is as dust-free as possible. Include a wide-spectrum antibiotic in the feed for the first month after arrival.

Provide any needed treatment within the first few days of arrival. This includes castrating; dehorning; vaccinating for rednose, blackleg and shipping fever; treating for lice; and worming. All of these practices can be completed at the same time. Consult the local veterinarian for any additional recommendations on handling newly purchased calves.

Most disease problems that calves bring to the farm show up within the first month after arrival. Check the calves several times daily for any signs of sickness, such as a failure to eat, tired appearance, coughing or drooping head and ears. Many diseases which strike new calves can kill quickly, so it

is very important to treat calves before they get very sick; consult a veterinarian for help.

Feeding Programs

Summer grazing program - Grass quality declines as the summer progresses. When this happens, the producer has two choices: to sell the calves in late July or August when pasture gains start to decline or to provide supplemental feed to make up for the declining pasture, usually beginning in early July.

The protein content of grass-legume pastures, grass fertilized with nitrogen and grass in early growth stages will usually be sufficient so that calves do not need additional protein. However, as the quality of the grass declines, protein will need to be supplemented. A grain mixture should supplement, but not replace, the pasture. Crude protein level in the grain mixture should be 6-8%.

Winter feeding - The types of feeds and rates of gain strived for will depend on marketing strategy. In a retained ownership program, animals are fed for a 1.5-2.0 pounds daily gain. They do not experience later weight losses due to marketing stress and therefore should produce more economical gains.

In a feeder calf program, animals are fed for a 1.00-1.25 pounds daily gain. Special attention should be given not to get these animals fat. Fat is more expensive to gain and worth less at market.

Generally, a good-quality grass should be provided as a roughage to help control scours for starting cattle on feed. Calves should be gradually placed on the grain ration by starting with two pounds of grain daily per head (along with free-choice hay), gradually increasing the grain fed by one pound per head every two days until desired gains are reached. Salt can be used to limit the grain and protein intake of calves on grain so that a self feeder can be used.

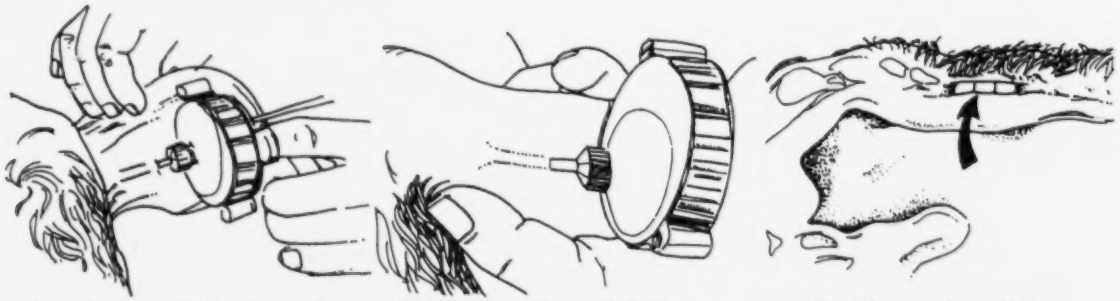
Additional Practices

Weigh the calves during the feeding period to determine their weight gain progress. Research indicates that calves will gain 20-25 pounds more on pasture with no additional feed if implants are used. Implants will be effective for about 100 days. Calves that are implanted in the fall should be implanted again in the spring (see Figure 4.3).

Summary

Purchasing the right type of cattle at the right price for a backgrounding program is very important to the success of the enterprise. When calves first arrive on the farm, they should be isolated and carefully observed for 30 days. Summer-grazed calves will either need to be sold when pasture quality starts to decline or be provided supplemental feed. Calves backgrounded through the winter and sold in the spring need a higher daily gain than those to be grazed the following spring. The use of implants results in higher weight gains.

FIGURE 4.3 - Implanting procedures



Implant pellets 1 inch from cartilage ring.

Back needle off 3/8 inch.

Implanted pellets (cut-a-way view)

Credits

UMC Extension Division agricultural guides

a) G2066: Rations for Growing and Finishing Beef Cattle (1985)
b) G2070: Salt to Limit Intake of Protein and Grain Supplements (1978)
c) G2072: Feeding Grain to Beef Cattle on Pasture (1982)
d) G2090: Growth Stimulants (Implants) (1984)
e) G2095: Backgrounding Calves (1981)

Gillespie, James R. Modern Livestock and Poultry Production, 2nd ed. Albany, NY: Delmar, 1983, pg. 174-175.

UNIT - BEEF PRODUCTION

Lesson 5: Finishing Feeder Cattle

Finishing feeder cattle is the final production step in putting beef on the consumer's table. Producers who finish cattle must select the right type of cattle for the right price, handle them to minimize death losses and feed them efficiently and economically.

Handling Newly Purchased Arrivals

Most feeder cattle losses happen within the first two or three weeks after the cattle are moved to the farm or feedlot. Some--if not all--of these losses could be avoided if the producer handles new arrivals properly.

Management - Have the facilities ready before the cattle arrive. Clean and repair the lot, equipment and fences. Fill in mudholes. Remove wire, stones and other objects from the lot. Provide unloading facilities and chutes so that the cattle can be handled with as little stress as possible.

Provide a small lot for treatment and isolation of sick animals; isolating sick animals helps facilitate treatment and helps isolate any outbreak of disease. Keep cattle from different farms separate as much as possible since each group has its own set of germs and immunities. Observe the cattle frequently, watching for those that fail to eat, appear tired or show other signs of illness. Promptly move sick animals to the sick pen for diagnosis and possible treatment.

Medical treatment - Consult a local veterinarian for advice on a vaccination program for the area. The vaccination program will vary according to the vaccinations given to the cattle prior to purchase. Vaccinate at the time of arrival if the cattle are healthy; delay vaccination for a few days if the cattle are sick or extremely stressed.

Cattle should be wormed at the first opportunity; this can be done whenever the cattle are run through a chute. Those cattle fresh off pasture may be infested with worms and will show marked improvement in feed efficiency after worming. Control lice and grubs. Lice irritate cattle, causing them to spend time scratching rather than eating. Grubs cause damage to muscle tissue, especially loin eye muscle.

Water - Use shallow pens or put a temporary fence across the lot to keep new arrivals close to feed bunks and water supplies. Force extremely stressed or dehydrated cattle to eat first by keeping them away from water for about five hours after arrival. This will build up energy supplies. For cattle that are badly dehydrated in transit, add electrolytes to the water to speed recovery.

Stock tanks may be needed for the first few days to provide water for cattle not used to drinking from automatic waterers. Sick animals can be treated easier the first few days by providing antibiotics and vitamins in the water.

Feeding - Getting cattle started on a finishing ration may be a problem, especially for those directly off pasture. Use a palatable roughage, such as good-quality grass hay or first-cutting alfalfa-brome hay. Spraying molasses over roughages will encourage the cattle to eat. Corn silage supplemented with protein can be used to start the cattle on feed.

Cattle that are not used to a grain ration should be started on grain gradually. Start with 1-2 pounds of coarsely ground corn or oats per head mixed with or spread over the roughage in the bunk. About 1/2 pound of the concentrate should be soybean meal (or its equivalent). Use plant proteins like soybean meal in preference to urea during the first three weeks. The ration's protein level should be 12-14%. Increase the grain fed by one pound per day until the amount of grain fed reaches a level of one pound per live cwt. Then increase the grain fed by 1/2 pound per day as the cattle clean up the previous feeding. Provide roughage free choice.

Supply extra Vitamin A mixed into the ration or in a free-choice mineral mix for the first three weeks. Include a broad-spectrum antibiotic in the feed for the first three or four weeks to help ward off health problems. Supply a trace mineral mix of 60% dicalcium phosphate and 40% trace mineralized salt.

Needed Facilities

Pens and fences - Lots should be large enough to provide adequate space for the cattle. Overall space allowed per head should be 200 $ft.^2$ for lots with mounds and 200-400 $ft.^2$ for flat lots. Resting areas, either under shade or inside sheds, should allow for 20-25 $ft.^2$ per head. If mounds are used, figure 1 ft. of mound length per head.

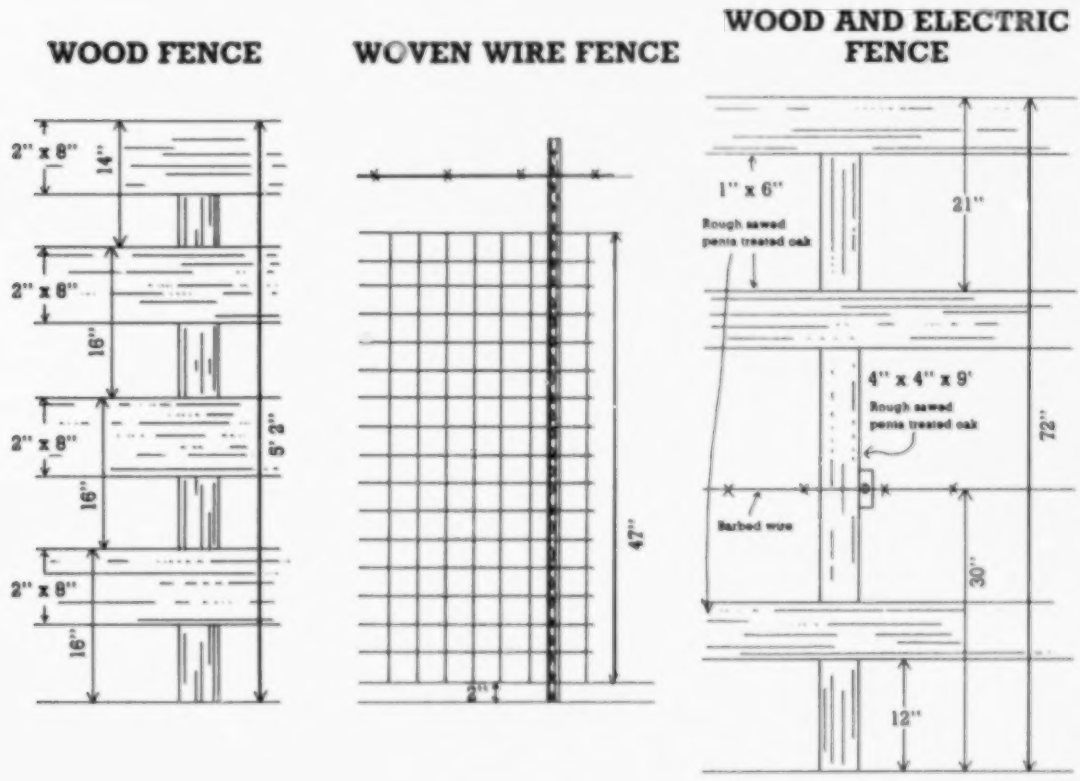
Muddy lots will be a problem, wasting the cattle's energy and causing price discounts when they are sold. Site selection is important in avoiding mud problems. If the lot slopes a minimum of 6% or the soil has good internal drainage, mud should not be a problem. Otherwise, build mounds in the pens to help ease the situation. Mounds should be 6-8 ft. high and topped with 4-6 inches of crushed limestone to help eliminate slick conditions.

Fences should be built stout enough to restrain the cattle. Combinations of barbed wire and electric fences may be used to keep fence costs low. See Figure 5.1 for some fencing ideas.

Feeding facilities - Provide adequate bunk space for each animal. When all animals eat at once, the bunk length should be 22-26 inches per head. When feed is always available, provide bunk space of approximately six inches per head. Plan the feeding system so that all feeding operations can be done without opening a gate. Feed storage, processing and feeding facilities should minimize the labor needed. One waterer will service 40 head of cattle.

Pollution control - Every feedlot system should be constructed to prevent air or water pollution from feedlot runoff. Nuisance lawsuits from nearby neighbors can result from feedlot odors, and runoff water from the feedlot can pollute streams and rivers.

FIGURE 5.1 - Fencing designs

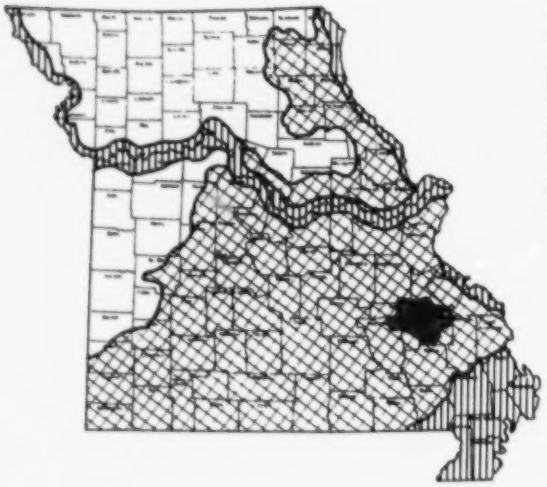


Pollution control will be different for every feedlot location, so selection of the feedlot site is very important in minimizing potential pollution problems. There are six important items to consider: topography and soil properties at the site, air movement, size of the feedlot, visibility of the feedlot and distance from neighbors, distances from wells and streams, and possible location for a soil-plant filter. See Figure 5.2 for potential groundwater pollution guidelines.

Handling and holding facilities - Well-designed handling and holding facilities are important to give cattle their necessary vaccinations and to load and unload cattle with the least trouble and stress. Minimum facilities include a holding pen with 30 ft.^{2} of space per head capacity, a crowding pen of 150 ft.^{2}, a working chute that is 18-30 feet long, a headgate, a loading chute and sick pens.

Additional useful features include additional holding pens, blocking gates, cutting gates, a squeeze chute and a set of scales. All of these facilities should be planned so that each pen has access to the handling facilities, holding pens, sick pens, etc.

FIGURE 5.2 - Potential groundwater pollution limitations on waste facilities



Zone 1: Little or no pollution problems; may be poorly drained

Zone 2: Flood plain; high water pollution potential

Zone 3: Limestone deposits may provide high pollution potential

Zone 4: Little or no soil for impoundment construction.

Credit: "Missouri Homeowner's Guide to Septic Tank Use," Missouri Department of Natural Resources, as reprinted in UMC Extension Division G1155: Confined Feeding Facilities (1981).

Feeding for Finishing

When finishing cattle, producers generally have two choices: feeding a high-energy ration or a low-energy one. The decision depends on the relative cost of the grain and roughage and the nutritive value of each. Table 5.1 shows the relative cost of several grains, based on their feeding value. Prices are listed across from their break-even points. For the price being compared, look above in other columns to find less expensive substitutes.

TABLE 5.1 - Comparing feed prices

Corn price per bu.	Oats/bu.	Barley/bu.	Grain sorghum/cwt.	Wheat/bu.
$1.50	$ .77	$1.22	$2.41	$1.65
1.60	.82	1.30	2.57	1.76
1.70	.87	1.38	2.72	1.87
1.80	.92	1.46	2.89	1.98
1.90	.97	1.54	3.05	2.09
2.00	1.02	1.62	3.21	2.20
2.10	1.07	1.70	3.38	2.31
2.20	1.13	1.78	3.54	2.42
2.30	1.17	1.86	3.70	2.64
2.40	1.22	1.94	3.86	2.64

2.50	1.27	2.03	4.01	2.75
2.60	1.33	2.11	4.17	2.86
2.70	1.38	2.19	4.33	2.97
2.80	1.43	2.27	4.49	3.08
2.90	1.48	2.35	4.65	3.19
3.00	1.53	2.43	4.81	3.30
3.10	1.58	2.51	4.97	3.41
3.20	1.63	2.59	5.14	3.52
3.30	1.68	2.67	5.30	3.63
3.40	1.73	2.75	5.46	3.74
3.50	1.79	2.84	5.62	3.85

A higher percentage of protein is needed for high-energy rations because fewer pounds are consumed by the animal daily. Urea or nonprotein nitrogen may be substituted for up to half of the ration's protein source in low-energy rations; it may also be used to supply all of the protein in a high-energy ration.

The most important minerals in the ration are calcium, phosphorus and salt. It is important to provide adequate amounts of Vitamins A, D and E. If animals are exposed to sunlight, adding Vitamin D will not be necessary. Most Missouri feedlot rations supply adequate Vitamin E.

Feed additives generally increase rate-of-gain or feed efficiency. Synovex, a sex-specific implant, has improved rate-of-gain 10-14% and feed efficiency 8-10% in college trials. Ralgro implants have increased rate-of-gain an average 10% and feed conversion 7% in feeding trials. Melengestrol Acetate (MGA) is an implant for feedlot heifers which suppresses heat; it has improved rate-of-gain an average of 10.3% and feed efficiency 6.5% in trials. Rumensin, a feed additive, has improved feed conversion of feedlot cattle by 10% and has reduced feed intake with little change in rate-of-gain for cattle on high-energy rations. It has also improved feed efficiency about 15% for cattle on pasture or high-roughage rations. Antibiotics are feed additives that generally increase feed efficiency and rate-of-gain by 3-5%.

When using feed additives and implants, always follow label directions for the number of days prior to slaughter that drugs and additives should be withdrawn from the ration.

Summary

There are four main areas of concern for producers who are finishing cattle. If the price is low enough for feeder heifers and they are managed to suppress heat, heifers can be fed out as economically as steers. Handling newly purchased feeder cattle to reduce death losses includes having the facilities ready; following a vaccination, medication and parasite control program; making sure that new arrivals drink adequate amounts of water; and starting cattle on feed. Cattle-handling facilities needed include a holding pen, crowding pen, working chute, headgate, loading chute and sick pens. The producer must also decide whether to feed a high-energy ration.